BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

(19) Office européen des brevets

(11) Publication number: 0 089 629
A3

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: 83102652.1

(22) Date of filing: 17.03.83

(51) Int. Cl.³: B 41 M 1/18
B 41 M 7/00

(30) Priority: 22.03.82 US 360841

(43) Date of publication of application:
28.09.83 Bulletin 83/39

(88) Date of deferred publication of search report: 01.08.84

(84) Designated Contracting States:
CH DE FR GB IT LI NL

(71) Applicant: Yoshino America Corporation
2500 Palmer Avenue
Park Forest South Illinois 60466(US)

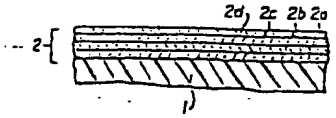
(72) Inventor: Haryu, Koichi
306 Douglas Road
Park Forest Illinois 60466(US)

(74) Representative: Altenburg, Udo, Dipl.-Phys. et al,
Patent- und Rechtsanwälte
Bardehle-Pagenberg-Dost-Altenburg & Partner Postfach
86 06 20
D-8000 München 86(DE)

(54) Plastics cylindrical body.

(57) A plastics cylindrical body with a printed pattern (2) formed on the peripheral surface thereof, said printed pattern being formed by ultraviolet-curable ink layers (2a, 2b, 2c) of at least three colors of yellow, red, and blue placed by printing one over another in the order of the brightness of the colors, with the color of highest brightness being in contact with the peripheral surface, said ink layers being cured individually by irradiation of ultraviolet rays.

FIG. 2



EP 0 089 629 A3

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: 0 089 629
A2

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: 83102652.1

(22) Date of filing: 17.03.83

(51) Int. Cl.³: B 41 M 1/18
B 41 M 7/00

(30) Priority: 22.03.82 US 360841

(43) Date of publication of application:
28.09.83 Bulletin 83/39

(84) Designated Contracting States:
CH DE FR GB IT LI NL

(71) Applicant: Yoshino America Corporation
2500 Palmer Avenue
Park Forest South Illinois 60466(US)

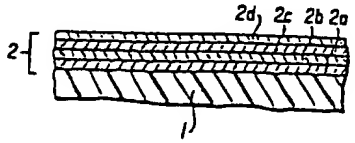
(72) Inventor: Haryu, Koichi
306 Douglas Road
Park Forest Illinois 60466(US)

(74) Representative: Altenburg, Udo, Dipl.-Phys. et al,
Patent- und Rechtsanwälte
Bardehle-Pagenberg-Dost-Altenburg & Partner Postfach
86 06 20
D-8000 München 86(DE)

(54) Plastics cylindrical body.

(57) A plastics cylindrical body with a printed pattern (2) formed on the peripheral surface thereof, said printed pattern being formed by ultraviolet-curable ink layers (2a, 2b, 2c) of at least three colors of yellow, red, and blue placed by printing one over another in the order of the brightness of the colors, with the color of highest brightness being in contact with the peripheral surface, said ink layers being cured individually by irradiation of ultra-violet rays.

FIG. 2



EP 0 089 629 A2

0089629

Yoshino America Corporation
2500 Palmer Avenue
Park Forest South
Illinois 60466, USA

March 17, 1983
P 4484-EP lu

Description

Plastics cylindrical body

The present invention relates to a plastics cylindrical body with a printed pattern formed on the peripheral surface thereof, and, more particularly, to a plastics cylindrical body having a pattern formed by the multicolor printing which exhibits a very attractive halftone.

Heretofore, the printed pattern on a plastics cylindrical body has been formed by, almost without exception, the complicated "masking process" in the case where the

pattern is a multicolor one. The reason for this is that if inks of different color are simply printed one over another, the inks mix together and do not show the desired tone of color. In addition, printing for a multicolor pattern has to be performed by "masking process" for each color, and the desired color has to be prepared previously because the masking process does not permit color mixing. This makes it necessary to provide inks of a great variety of colors.

As mentioned above, conventional plastics cylindrical bodies having a multicolor pattern have a disadvantage that the process for printing the multicolor pattern is complicated, a great variety of inks are required, and yet a subtle halftone cannot be made at the boundary between different colors.

The present invention has been completed in order to obviate the above-mentioned disadvantage involved in conventional plastics cylindrical bodies having a multicolor pattern. The invention will be described into detail with reference to the accompanied drawing illustrating an example.

Fig. 1 is a perspective view of an embodiment of the invention.

Fig. 2 is a partly enlarged sectional view of an embodiment of the invention.

Fig. 3 is a schematic view illustrating the most preferable method for producing the cylindrical body according to the invention.

The plastics cylindrical body according to the present invention is made of a synthetic resin such as polystyrene resin, polypropylene resin, and polyethylene resin. The peripheral surface of the thin wall 1 of the plastics cylindrical body is decorated with a pattern 2 which is formed by printed layers 2a, 2b, 2c, ... of ultraviolet curable inks of at least yellow, red, and blue placed one over another. The inks of different color are cured individually by irradiation of ultraviolet rays, and they are placed one over another in the order of the brightness, with the one having the highest brightness being in contact with the peripheral surface of the wall 1.

The printed layers 2a, 2b, 2c, ... forming the pattern 2 are placed one over another, and thus it is possible to obtain an attractive halftone by overlapping two or more colors.

Since the printed layers 2a, 2b, 2c, ... are cured individually by irradiation of ultraviolet rays, the ultraviolet curable inks do not mix together prior to curing. This ensures the formation of desired tone of color.

The printed layers 2a, 2b, 2c, ... are placed one over another in the order of the brightness, with the one having the highest brightness being in contact with the peripheral surface of the wall 1. This permits overprinting of black letters on the pattern (2) wihtout the need of the conventional complicated "masking process".

The process for curing individually the printed layers 2a, 2b, 2c, ... of the pattern (2) will be described with reference to Fig. 3, in which the cylindrical body

is transferred intermittently along the arrows, with stoppage at stations marked by single circles and double circles. Printing is performed at the stations I indicated by single circles, and irradiation is carried out at the stations K marked by double circles. During the transfer along the line, the cylindrical body is turned in one direction at a constant speed.

The cylindrical body put on the line undergoes printing with an ultraviolet curable yellow ink at station I_1, and then moves to the next station K_1 for curing with irradiation of ultraviolet rays. Thus, the first printed layer 2a of yellow ink is formed. In the same manner, the second printed layer 2b of red ink, the third printed layer 2c of blue ink, and a fourth printed layer 2d of black ink are formed at the subsequent stations, and finally, the pattern 2 is completed.

The printing immediately followed by curing prevents inks from mixing together even when inks of different color are put one over another continuously.

As mentioned above, the present invention has advantages that overprinting without mixing of inks provides a very attractive halftone and the ink of lowest brightness placed on the outermost layer provides distinct letters or lines without the need of "masking process".

BARDEHLE, PAGENBERG, DOST, ALTENBURG & PARTNER

RECHTSANWÄLTE
JOCHEN PAGENBERG DR. JUR., LL. M. HARVARD**
BERNHARD FROHWITTER DIPL.-ING.*
GÜNTER FRHR. v. GRAVENREUTH DIPL.-ING. (FH)*

PATENTANWÄLTE – EUROPEAN PATENT ATTORNEYS
HEINZ BARDEHLE DIPL.-ING
WOLFGANG A. DOST DR., DIPL.-CHEM
UDO W. ALTENBURG DIPL.-PHYS.

POSTFACH 860620, 8000 MÜNCHEN 86
TELEFON (089) 980361
TELEX 522791 pad d
CABLE: PADBÜRO MÜNCHEN
BÜRO: GALILEIPLATZ 1, 8 MÜNCHEN 80

0089629

DATUM March 17, 1983
P 4484-EP 1u

C L A I M S

1. A plastics cylindrical body with a printed pattern (2) formed on the peripheral surface thereof, said printed pattern being formed by ultraviolet-curable ink layers (2a, 2b, 2c) of at least three colors of yellow, red, and blue placed by printing one over another in the order of the brightness of the colors, with the color of highest brightness being in contact with the peripheral surface, said ink layers being cured individually by irradiation of ultraviolet rays.

2. A plastics cylindrical body according claim 1 with black letters overprinted on the pattern (2).

FIG. 1

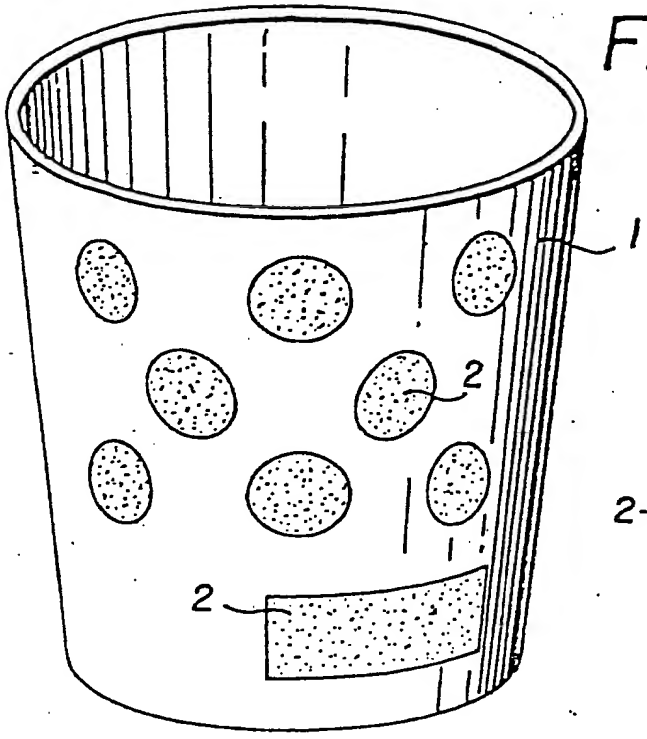


FIG. 2

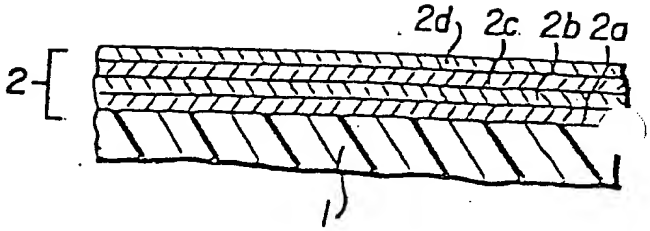
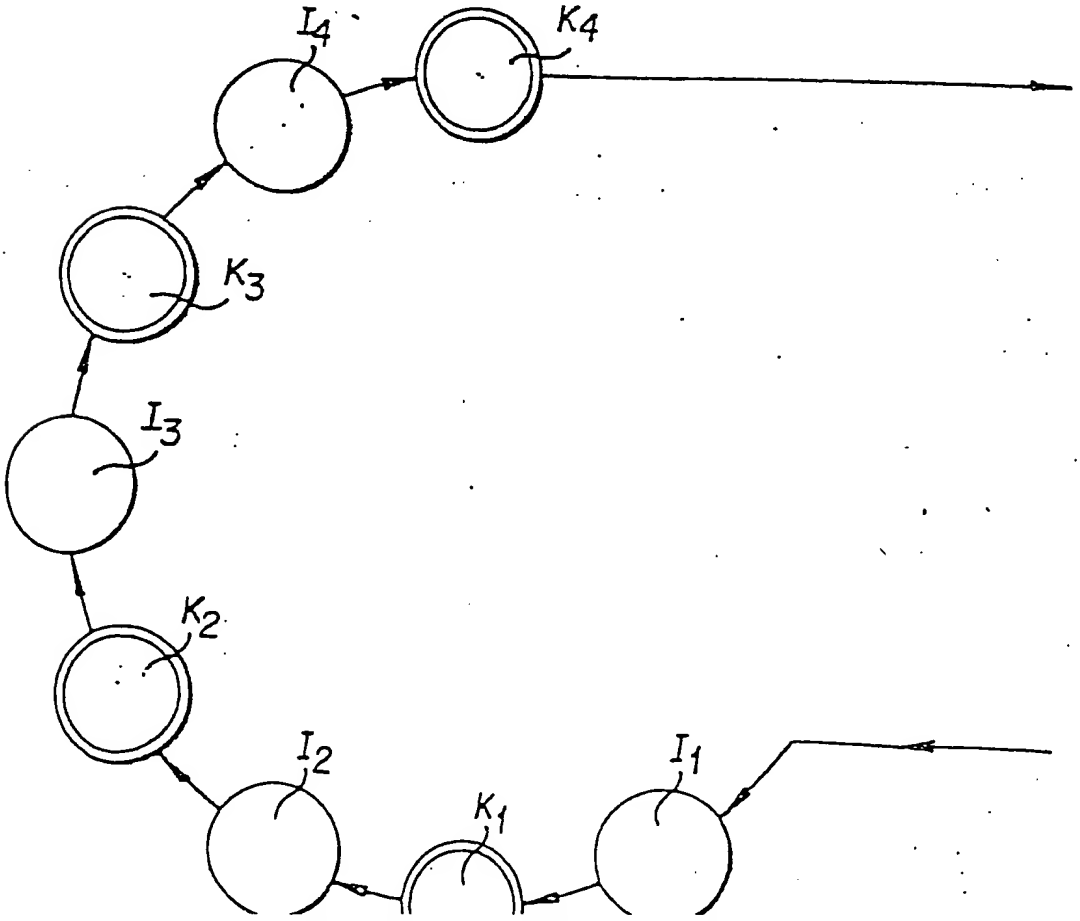


FIG. 3



European Patent Office

EUROPEAN SEARCH REPORT

0089629
Application number

EP 83 10 265?

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int Cl ³)
	DAW		B 41 M 1/18 B 41 M 7/00
X	DE-A-2 558 312 (REINHARD MOHN) * Claims 5,7,13; page 13, lines 11-20 *	1,2	
X	CH-A- 592 526 (BRUHIN AG) * Claims; figures; column 2, lines 6-41 *	1,2	
X	BE-A- 346 229 (SCHWIMMER) * Claim 3 *	1,2	

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

B 41 M 1/18
B 41 M 7/00
B 41 M 1/40
B 41 M 1/30

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	10-04-1984	RASSCHAERT A.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO Form 1503 03.82